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2023

marketing measurement
innovation series

module 3
Advances in AI and
machine learning powering
marketing measurement

advertising effectiveness council

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This paper is a collaboration of the iab advertising effectiveness council

The IAB Ad Effectiveness Council have collaborated on this whitepaper to help increase understanding across the industry on how to protect the insights that businesses need to grow, along with best practices for assessing the impact of digital advertising into the future.

The IAB Ad Effectiveness Council undertakes various activities to provide guidance to the industry on the best methods to assess the impact of marketing activities along with insight and inspiration to help marketers optimise their digital advertising investment. The Council includes representatives from media owners, data agencies, media agencies, research companies, tech vendors and advertisers.

The contents of this guidance paper are not necessarily reflective of individual company policies, rather it is a collaborative effort of the members of the council to provide greater understanding to the market.

Contents

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background to the marketing measurement innovation series

The greater restrictions and phasing out of device IDs and third-party cookies along with Australia's evolving privacy legislation presents fundamental but positive change for the digital advertising industry. The reduction in media and customer data available is significantly impacting marketing measurement but provides the opportunity to re-think digital marketing and measurement frameworks to support core industry use cases, while balancing consumer privacy.

Across the industry there is evidence that marketers, agencies, media owners and vendors are getting ahead of these changes, learning how to meet consumers' greater expectations for data privacy and, from an advertising effectiveness perspective, adjusting their measurement in response to signal loss. Innovations are occurring across the industry to protect the insights that businesses need to grow, along with best practices for assessing the impact of digital advertising into the future.

The IAB Ad Effectiveness Council's objective with the 'Marketing Measurement Innovation Series' is to highlight that, while measurement is often seen as a challenge, insightful assessment of marketing effectiveness and campaign performance can continue, in a privacy compliant way. The series will highlight real case studies and demonstrate practical examples of how the industry is moving marketing measurement beyond the cookie.

In module one of this innovation series, 'Mapping the Future of Marketing Measurement', provides an overview of the proposed reforms to Australian privacy legislation impacting ad effectiveness measurement along with a recap on the technology changes resulting in the degradation of signals required for some ad effectiveness measurement techniques. The paper also provides perspectives from across the industry on how ad measurement toolkits are being adapted to allow for successful ad assessment into the future.

The second module in the innovation series, 'First-party Data Unlocking Measurement Capabilities', is focused on how first-party data is unlocking measurement capabilities and includes information on using data collaboration platforms for measurement and guidance for quality data inputs for specific measurement techniques.

download the series of papers
'Mapping the future of marketing measurement'

download now

In this third module of the innovation series, 'Advances in AI and Machine Learning Powering Marketing Measurement'

Outlines how these technologies and tools are currently used and how they may evolve into the future to support greater efficiencies and effectiveness of digital advertising along with faster and more granular measurement insights.

Look out for these subsequent modules in the 'Marketing Measurement Innovation Series' to be released soon:

- Evolutions in market mix modelling

- Continuing test and learn experiments

- Developments in ad attention measurement

introduction to the ai opportunity

Artificial Intelligence (AI) leverages computers and machines to mimic the problem-solving and decision-making capabilities of the human mind.

AI is already impacting and improving many aspects of our lives. The scope and speed of innovation in AI makes writing a paper on the topic very challenging. In this introduction section, the IAB Ad Effectiveness Council acknowledges the much broader context for AI and its benefits and challenges for society, the economy and the advertising industry, however predominantly our aim with this paper is to focus on the advances in AI and machine learning that are powering marketing effectiveness measurement.

McKinsey and Company research (Australia's Automation Opportunity Report 2019) outlines that powerful new automation technologies such as machine learning, AI and advanced robotics have already started to transform the Australian economy and are set to reach scale in the decades ahead. These technologies present an enormous opportunity to the Australian economy and if seized this opportunity could add $1.1 trillion to $4 trillion to the economy over the next 15 years.

AI is being used across a range of industries (healthcare, finance, manufacturing, retail, transport) and as technology continues to develop, we can expect to see even more innovative and beneficial applications of AI in the future.

Examples of the business opportunities in AI:

Automating tasks

AI can automate many tasks that are currently done by humans, freeing up time and resources for other activities.

Improving decision-making

AI can be used to analyse large amounts of data to make better decisions.

Creating new products and services

AI can be used to develop new products and services that were not possible before.

Personalising experiences

AI can be used to personalise experiences such as recommendations for individuals.

Solving complex problems

AI can be used to solve complex problems that are beyond the capabilities of humans.

What is AI?

There is no single agreed definition of AI. It is used to describe a range of tools and applications and many of these seem to get used interchangeably.

IBM describe, "at its simplest form, **artificial intelligence is a field, which combines computer science and robust datasets, to enable problem-solving.** It also encompasses sub-fields of machine learning and deep learning, which are frequently mentioned in conjunction with artificial intelligence. These disciplines are comprised of AI algorithms which seek to create expert systems which make predictions or classifications based on input data." (Source; IBM)

Several of the major concepts across the AI and machine learning ecosystem are defined in the IAB US whitepaper, Artificial Intelligence Use Cases and Best Practices for Marketing, 2021.

Artificial intelligence

Or AI is the empowerment of machines to use reason and understanding to complete tasks, unlike natural intelligence, which humans and animals employ and involve conscious reasoning and understanding. Relevant applications include natural language processing, machine learning, computer vision, deep learning, cognitive science.

Machine Learning

The practice of machine learning (ML) focuses on the development of computer programs that can access data and use it to learn for themselves. Relevant applications include bid optimization, image recognition, content, understanding campaign performance.

Algorithm

An algorithm is a sequence of well-defined computer instructions that solve a problem or perform a computation such as calculations, data processing, or automated reasoning. Relevant applications include real-time bidding, ad tech solutions, creative optimization.

Interest across the media and advertising industry has heightening since the launch of ChatGPT.

There is significant interest across the media and advertising industry around AI since the launch of Chat GPT, as everyone is now experiencing for themselves the evolution from Machine Learning and Natural Language Processing into AI. This has resulted in machines having the ability to mimic or imitate human intelligent behaviour and perform human-like tasks.

The GPT refers to 'Generative Pre-trained Transformer'. The model has been trained on vast amounts of information from the internet including websites, books, news articles and more. It has been fine-tuned with human conversational examples through supervised learning and reinforcement learning from human feedback.

Ipsos iris reports that around 3.5 million Australians aged 14+ have used Chat GPT during the month of August 2023. In addition to answering simple questions, Chat GPT can compose essays, summarise content, create charts and tables, write code and lots more.

Alphabet, Google's parent company, have also launched a conversational AI chatbot named Bard and there are many other types of AI content generators available with a variety of uses for consumers and businesses.

Australians' usage of Open AI (Chat GPT)

audience (000s) and time spent pp (mins) trend

audience profile
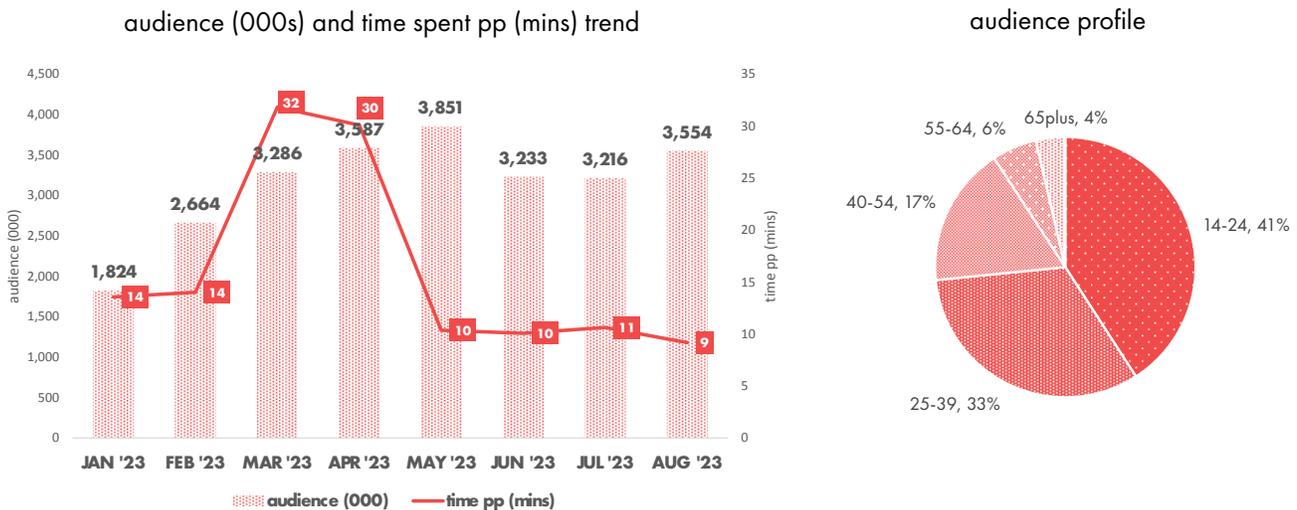
Source: Ipsos iris Online Audience Measurement Service January – August 2023, Age 14+, PC/laptop/smartphone/tablet, Text only, Brand Group, audience (000's), average time spent per person (minutes)

The IAB advocate for safe and responsible AI.

While the developments in AI are exciting, the speed of innovation could pose new risks which creates uncertainty and gives rise to public concerns. The Australian Government has recently held a consultation looking at ways to mitigate any emerging risks of technologies such as AI (consultation closed 4th August 2023). The 'Supporting Responsible AI Discussion Paper' identifies challenges and risks such as AI being used for potentially harmful purposes, problems created from inaccuracies and bias in AI models and privacy concerns.

IAB Australia has provided the Department of Industry, Science and Resources with a digital advertising industry perspective on safe and responsible which IAB members are able to read on the IAB website.

download the iab australia submission on safe and responsible ai.

download now

AI is already an embedded part of digital advertising.

While a lot of the industry discussion about AI focuses on what it could do in the future, it is already an embedded part of digital advertising. In an advertising context, AI and machine learning are integrated into industry practices, including in the placement, delivery, creation and measurement of ads as well as the management of ad fraud. Many critical functions within the industry would not be possible without AI.

Programmatic advertising, that now accounts for over 40% of digital display advertising buying for content sites, uses machine learning to:

- **make predictions about consumer behaviour and purchasing patterns based on data inputs, for example, to determine when a user is most likely to see a particular ad and engage with it; and**

- **make automated decisions to about the most effective delivery and placement of those ads, based on those predictions.**

In a recent article, IAB Australia's Tech Lead Jonas Jaanimagi, outlines that AI's core capability of crunching data at scale should dramatically improve the speed and resources required by humans enabling improved ad targeting, reduced ad fatigue, better executing dynamic creatives and ultimately maximising customer engagement.

read the article 'artificial intelligence (ai) in digital advertising – hopes and fears'

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Data is a core component of digital marketing and so AI and machine learning are becoming essential to the modern marketer's toolkit.

AI technology enables us to manage the terabytes of data driving digital marketing success.

Marketers are showing increased interest in AI particularly when it comes to improving campaign efficiency and the greater restrictions and phasing out of device IDs and third-party cookies has led more marketers to evaluate and experiment with AI and machine learning.

It's time to define how to use AI to build better ad experiences, help buyers and publishers find better audiences and offer recommendations on how to improve performance and create better ads.

AI and machine learning in marketing measurement and measurement

Given the continued fragmentation and ever-expanding advertising opportunities in the media landscape and increased focus on privacy, AI and machine learning will be a critical piece in the future of measurement solutions.

In previous modules of this series, the IAB Ad Effectiveness Council have outlined the importance and potential of first-party data in driving future measurement capabilities. Marketers are developing deeper partnerships and direct integrations of data sets across the industry between agencies, technology providers, media owners, measurement companies and others with trusted sources of quality first party data. These first-party data partnerships, along with statistical analysis techniques and advancements in AI and machine learning, are key to evolving the way we measure marketing performance, unlocking more granular optimisation and faster insights delivery.

The IAB's research has found there is a shift underway across the industry to using to more privacy compliant measurement techniques, along with combining usage of multiple tools to assess the impact of ad investments. Agencies and marketers are learning how to integrate multiple measurement tools as there is no silver bullet, no one technology, methodology or metric that will alone provide the full picture of marketing effectiveness and ROI.

Successful measurement will require adjustment in measurement frameworks to aggregate multiple techniques, continuous experimentation to validate measurement strategies and looking at more holistic performance goals. In response, vendors are evolving some of the commonly used measurement techniques using advances in machine learning.

Attribution

Attribution modelling is a technique which evaluates how different touchpoints contribute to a sale or action by assigning credit based on their level of involvement. Statistical models are built with individual user level data across channels to analyse the difference in media interactions between "converters" and "non-converters". These channels can then be assigned contribution ratios in close to real-time which are used to inform allocation of spend.

Multi-touch attribution (MTA), sometimes referred to as mapping the consumer journey or path to conversion, is the process of assigning credit to digital media touchpoints that have contributed to a conversion. While there are various attribution techniques, at least some of these use machine learning models to automate the process of defining a user's activity or probable activity online.

Attribution techniques are highly reliant on third-party identifiers and marketers are moving away from the use of attribution in favour of more sustainable and privacy compliant measurement techniques in preparation for the full retirement of third-party cookies in 2024.

Is attribution doing more damage than good?

The impact of the reduction in third-party identifiers on attribution modelling is an example of the critical importance of quality data input for accurate marketing measurement.

At [IAB Australia MeasureUp 2023, Analytic Partners](#) presented an analysis that demonstrated that with 59% of impressions now not visible, attribution measurement is providing an incomplete view of acquisition spend and is significantly underestimating upper funnel activity and channels such as video.

In a simulated analysis, Analytic Partners found that missing impressions in attribution measurement means conversions are reduced by 8% and average touchpoints per path reduced by 29%. Implementing experiments as a short-term solution for day-to-day reporting/optimisations is recommended but a more holistic approach is required for bigger media planning decisions. Attribution modelling alone cannot now be relied upon.

Market Mix Modelling

Market Mix Modelling (MMM) is a statistical analysis technique used to measure and quantify the impact of various marketing variables on sales or other key marketing performance indicators. It helps in determining the optimal allocation of marketing spend resources across different marketing channels and activities.

Econometrics are a set of statistical tools that aim to quantify the relationship between cause and effect in economic data. In marketing, this takes the form of MMM which predicts how all advertising activity (e.g. TV, print, out of home, online video, social media, and search) translates into incremental sales. Models can also include the impact of factors outside the advertiser's control such as the weather. Incremental sales are those directly attributable to marketing activity and enable marketers to identify and quantify the impact of their investments.

MMM uses machine learning models to statistically analyse and estimate historical data inputs to predict how marketers can most effectively invest in future marketing activities. As with all machine learning models, this requires sufficient data inputs in order for the outputs/predictions to be effective.

As cookie-based attribution declines in accuracy more marketers are moving to sustainable measurement such as MMM and more and more research vendors are offering automated MMM systems using AI/machine learning.

MMM has seen rapid evolution in recent years thanks to the power of cloud computing, bringing the speed of insights down from months to days. Advancements in machine learning and computing power have resolved some of the common complaints of MMM, like timeliness and provide the capability of drilling down into more granular drivers of performance such as creative, format and geography.

Ad attention measurement

Other methods of measurement are continually being developed. For example, new and improved technology has been developed to measure the time that a consumer's gaze is on an ad. There are various methods available in the market to measure ad attention using either technology-based solutions employing ad tagging or eye-tracking cameras with a panel of respondents, or a combination of these techniques are being developed to quantify eyes on ads and the degree of attentiveness.

Data is being used to build machine learning models to estimate and predict a person's attention on an ad, and therefore the ad's effectiveness. Further information about methodologies available in market for measuring ad attention can be found in the IAB Ad Effectiveness Council's, Ad Attention Measurement Landscape Report.

Look under the bonnet!

Modelling used for marketing measurement will always have a degree of error, models are not perfect. Even AI can't identify what isn't in the dataset it's looking at. Its important that your Data Scientist can look under the bonnet at the model and conduct testing and statistical due diligence.

A variety of factors can impact accuracy, for example:

- Simplified assumptions about the relationships between marketing variables (e.g., Advertising spend, promotions) and business outcomes (e.g., Sales, revenue).
- The degree of availability of quality and comprehensive data
- Changing consumer preferences, competitive landscape, economic conditions, and other external factors
- Limitations on capturing psychological and sociological factors
- The modelling process itself can introduce errors

Data Scientists can use well known statistical measures to assess the accuracy of models used in marketing measurement, such as:

R-squared
Is a measure of how well the independent variables (predictors) in a mixed model explain the variation in the dependent variable (response). As a guide, R^2 is considered good if it is more than 0.8.

MAPE
Is a measure of the accuracy of a predictive model. MAPE can be used to evaluate how well the model's predictions match the observed data, which is especially useful for forecasting or predictive modelling tasks. A lower MAPE indicates a more accurate model. For MAPE, the goal is for it to be 10% or below.

considerations for marketers **4**

Align AI approach and measurement with business objectives

- Start with a clear set of objectives that relate to your business challenge, understand strengths and weaknesses of AI approaches and measurement methodologies to determine what tools are right for your business and how these align to achieve your stated objectives.

- Separate AI hype from the reality, understand and evaluate the various AI/machine learning approaches to ensure that it solves gaps and problems.

Experiment and plan for leveraging advancements in computing power and data availability

- Start getting ready for the inevitable mandate that everything that can and "should" be automated is automated and be able to leverage the efficiencies AI will drive.

- Experiment with AI/machine learning enhanced ad measurement and optimisation techniques and gain understanding on how to use the tools to maximise media investment.

Keep trust, transparency and privacy at the forefront

- Observe transparent and privacy-centric approaches. Ensuring AI is transparent and explainable will be important for identifying risks and potential harms of AI, as well as for empowering users to make informed decisions, ensuring accountability and promoting trust and confidence in AI.

- Transparency should be incorporated early into product design and development processes in order to be most effective and should be appropriately balanced with competing risk factors such as commercial confidentiality and security.

Select models and partners carefully

- Marketers and publishers need to select tools and vendors carefully, and consistently monitor the input of intelligent machines as well as the output.

- Consider if you can explain the model, for example to your CFO.

- Invest in or collaborate with data scientists with expertise in AI and machine learning.

Ensure data quality and quantity

- Ensure you have sufficient data going into your models that is accurate, relevant, and up-to-date.

- Understand what data is being applied and how that data is affecting the result. Evaluate the key data that the model is using to learn more about your inputs and the quality or reliability of the data.

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Have strategies in place to detect bias

- Algorithmic bias is one of the biggest risks of AI (bias can occur when datasets used to train a model or algorithm are not comprehensive). This is also a concern for our industry as bias has been shown to reduce the effectiveness of advertising campaigns and damage customer relationships. However, AI tools will also play an important role in identifying and minimising biases.

Continue to evaluate the efficacy of your models

- Continue to evaluate the efficacy of an AI model over time, as the underlying data may change, or there may be product modifications that introduce new variables that drive performance.

- Evaluate new data sets that could be used to improve modelling.

industry perspectives on how ai and machine learning are powering marketing measurement now and into the future 5

The ABC of AI: Traditional AI and Generative AI

John Cucka | Head of Analytics, Kantar Australia

The idea of human-like automata can be found in virtually every civilisation and throughout works of art and literature at least as far back as Greek mythology; however, the modern study of AI as we know it, can be traced back to 1956 at Dartmouth College in the UK followed by variations in applications in small tech bubbles through the late 20th Century. Today it is Generative AI models that are capturing popular imagination and widespread application in ways that previous incarnations did not.

Our world is being reshaped by technology right in front of our eyes.

Businesses everywhere are scrambling to create AI roadmaps and strategies that match the new pace of advances. So how can you navigate the emerging complexity to identify opportunities to leverage AI and be armed with the human knowledge about models and implementations to quickly digest and respond to developments?

The modern paradigm of artificial intelligence is based on machine learning – algorithms that enable machines to learn from data without being explicitly programmed. **The two main approaches are colloquially known as Traditional AI and Generative AI, and they differ in important ways.**

Traditional AI models are mostly focused on advanced analytic tasks such as prediction or clustering. They typically work with just one form of data and are trained for one specific task at which they become very proficient. They need to be trained from scratch and 'fine-tuned' to perform well on different tasks. The classic example is predicting churn risks in real-time from customer activity. More recently, the emergence of Large Language Models (LLMs) has extended traditional AI into non-numeric data, such as customer experience verbatims or social media listening, leaving to applications such as identifying category trends and predicting whether they will fizzle out (e.g. "Danger Restaurants") or become the next big thing (e.g. Bubble Tea).

On the other hand, **Generative AI** is based on foundation models that can ingest various types of data (think text, image, video) and leverage the model to output any or all variations of these input types. Gen AI models require lots more data (insanely huge amounts) than traditional AI models. But, when they are provided with that volume of data, they are more versatile: they can do things they weren't explicitly trained for, because the immense volume of data gives them more options to work with, so the 'generative' part can create outputs that resemble, without replicating, that huge store of training data. Examples include generating new product or ad concepts to jump-start the development process.

Neither form of AI is necessarily 'better' or 'worse' than the other

Each has its own benefits depending on the intended use case and in fact in many practical situations, the best solution involves a combination of both. And far closer than ever to the imaginations of those early visionaries, the advent of AI tools is well described as signalling a fundamental shift in how industries – and even the world – must operate.

Undeniably, some of the capabilities that generative AI implementations have demonstrated are intriguing, entertaining, and impressive. Equally, some applications are distinctly troubling, whether for industry, labour, or broader society. **Therefore, you must consider a spectrum between two modes of exploration: enthusiastic experimentation ("because we can!") at one extreme, versus thoughtful ("should we?" and "what could go wrong?") testing and deployment at the other.**

Both modes of development are valid and rewarding; the path chosen often reflects on the values and objectives of the organisation, team or individual investigating the technology. And both modes bear fruit. So, it is not unusual for many businesses, including here at Kantar, to leverage the former (enthusiastic experimentation) in the (secured, controlled) back room for the development of tools, to incubate leaps in capability. Then, we can systematically build out and deliver the best solutions by leveraging the latter (thoughtfully assessed) mode, from which we can then deploy with confidence to our clients.

Which tools sound right for your business? Traditional or Generative? And how will you develop and deploy them? Through enthusiastic experimentation or thoughtful testing? Understanding the options will give you confidence to pursue AI for your business.

AI driving efficiency, freeing up time to invest in quality campaign inputs and optimisation

Andrew Macdonald | National Head of Paid Search & Social at Dentsu

Although much of the recent focus around AI has been on Generative AI, we have seen significant improvements in AI's ability to process large amounts of data to analyse patterns of behaviour and predict advertising outcomes. With ongoing signal loss impacting attribution and consumers using multiple devices, apps and browsers, we have seen the rise of 'modelled' or predicted conversions as a way of estimating conversions that are unable to be observed using privacy-preserving aggregated data.

This has allowed advertisers to bridge some of the conversion gaps caused by ongoing privacy updates. Examples of where modelling has been used include cookie consent limitations, cross-device conversions, the impact of iOS14 and third-party cookie limitations (ITP).

Modelling provides an essential safeguard for advertisers to be able to continue measuring and optimising digital media. For example, following the significant signal loss from the iOS 14 update, Meta has now built a new architecture. The 'Lattice' system is able to infer more likely user responses, without requiring as much direct data insight from each person. This provides a tech workaround using AI and predictive technology to overcome limitations from Apple's data tracking restrictions.

Although these only provide 'estimated outcomes', improvements in AI are leading to greater accuracy. This not only fills a gap in measurement, but it also powers the bidding algorithms that optimise client outcomes, allowing for more accurate targeting and personalisation. Bidding algorithms rely on quality inputs and conversion modelling has allowed advertisers to continue measuring and optimising media towards business outcomes. However, the 'recovery' of conversions depends on the amount of observable data which is set to diminish significantly further.

Looking ahead to 2024, we are seeing this lead to 2 key AI developments:

- **AI Investment into cookieless measurement solutions such as Market Mix Modelling (MMM)**

- **Advancements in AI platforms that help predict outcomes before an ad has been served, whether it be attention, motivation or creative quality.**

Both emerging trends provide future-proofed measurement and optimisation solutions.

MMM is making a resurgence as privacy challenges evolve and attribution becomes more difficult.

But traditional MMM comes with challenges and AI is looking to solve some of these by making MMM cheaper, faster, more actionable and more robust.

In a recent Warc whitepaper 'when entertainment meets effectiveness: a guide to maximising impact', they describe the future of MMM as "in the cloud, on-demand and powered by AI". It goes on to report that with models already using Bayesian neural networks, "it would reduce time to generate mixed model outputs down to even a few hours."

Locally, we are seeing some exciting developments. Mutinex recently secured a $5m seed extension to further scale their AI ambitions off the back of an updated Bayesian model to understand growth.

AI innovation in MMM will allow advertisers to benefit from near real-time data. This will enable advertisers to gain a better forward view of campaign performance and to make more informed decisions based on timely feedback loops. These data-driven insights will help advertisers take action on their campaigns more quickly and effectively, ultimately leading to greater success. Additionally, as the costs and complexities associated with MMM decrease, more advertisers will be able to leverage its benefits, leading to greater accessibility.

Predicting outcomes before an ad has been served.

Research companies, such as Kantar are also developing AI solutions to evaluate and predict creative quality and outcomes. This not only helps brands understand creative impact during a campaign, but they can predict outcomes before an ad serves an impression. At dentsu, our global Creative Intelligence unit has been experimenting in this space to understand the value of creativity using AI technology to understand, measure and predict creative effectiveness. Although we are still in the early stages, we have combined 38 data points from 3 key indicators (visual features, visual attention data points, adherence to creative best practice) of performance & brand growth into a customised deep learning model and tested this specifically for one of our large global clients. Our alpha testing shows that Creative Quality Score of ~80% could save them an estimated 8% - 14% (estimate based on alpha testing) of media investment to drive the same campaign performance after training the model with historical client media, creative sets as well as visual attention inputs. It's still early days and we have experienced limitations in achieving sufficient scale of data sets. However, we are seeing progression both within our agency and the wider industry, which is looking promising.

AI trained and verified with eye tracking has transformed the much-hyped field of attention measurement and AI platforms, such as Persado, use 'motivational AI' to deliver precise language that motivates the individual through analysis of consumer response patterns (their AI analyses 1.2B consumers with 100B interactions annually) so we are starting to see more and more AI use cases emerging for creative effectiveness.

There are some clear limitations around the quantity and quality of the data used to train AI models that can affect the accuracy of the predictions. But ultimately, AI can drive efficiency, and save time and costs, allowing advertisers to invest time in quality campaign inputs and optimisation.

industry perspectives on how ai and machine learning are powering marketing measurement now and into the future

Democratising Measurement with AI and Machine Learning powered Open-Source Techniques

Aimy Le | Marketing Science Partner, Meta

At Meta, AI has been core to our company's development and the advancements we've made that are powering innovation, cutting-edge research and new tools for creativity and connection. Since 2018, we've spent more than $90 billion on capex, much of that on building out infrastructure to support growth in AI and AI-based tools, and we expect to spend another $30 billion this year to increase our AI capacity. AI powers a stronger Discovery Engine (the algorithm that helps users discover new content on Meta platforms) and it helps detect and remove harmful content from our platforms. It also improves ads relevance and automates experiences for marketers, allowing advertisers to drive better results with less time and effort.

Meta also believes in open-sourcing and making our code or stack publicly available to the world, free of charge. You may have heard of existing Meta open source codes, such as the popular machine learning framework PyTorch and Meta's next generation of open source large language model Llama 2. When it comes to marketing effectiveness measurement, we believe that all advertisers, irrespective of the size of their research budgets, should be able to access high quality and signal-resilient measurement - especially given signal losses in the digital ecosystem and the impact it has on other measurement techniques like attribution.

The Meta Marketing Science team have written and published several Open-Source Techniques (OSTs) that incorporate machine learning features to reduce any potential human bias that comes with measurement, simultaneously increasing the speed and agility of running such analyses.

Machine Learning in Market Mix Modelling (MMMs)

One of the most popular Marketing Science OSTs is Robyn, our open-source MMM code. Robyn can be used to run in-house MMMs and comes with detailed documentation and step-by-step guides to assist with implementation. It incorporates contemporary methodologies based on the latest MMM research, where it aims to reduce human bias in the modelling process.

One of the key features of Robyn is the use of machine learning to automate decisions that MMM analysts historically would have to make when building the models - decisions such as how much carryover effect a media channel has in subsequent time periods (adstocking) or how quickly a media channel approaches diminishing returns (saturation).
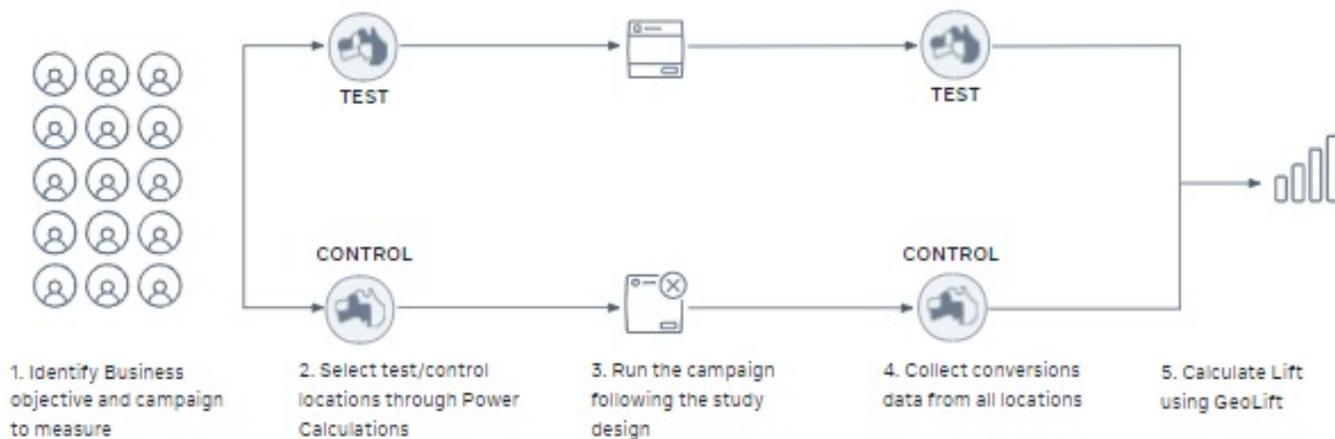
In Robyn, this is handled by another Meta AI library Nevergrad, which conducts "automated hyperparameter optimisation with evolutionary algorithms".

In layman's terms, Nevergrad iteratively tests different adstocking and saturation hyperparameters, where it learns over time as more iterations are run. Ultimately, Robyn can take thousands of models and narrow it down to a couple of models with hyperparameters that best fit the data.

While human intervention is still required to select the final model, the use of machine learning has reduced the need to manually and subjectively select the hyperparameters - speeding that part of the modelling process and enabling marketers and analysts to invest more time into other areas.

Machine Learning in Geo-based Incrementality Testing

Another popular Meta Marketing Science OST is GeoLift, our open-source code to measure the incremental impact of a campaign at the geographical level. In GeoLift, ads are shown to the test market, no ads are shown to the control market and the sales/conversions across the two markets are collected and analysed to measure the incremental lift due to the ads:

1. Identify Business objective and campaign to measure

2. Select test/control locations through Power Calculations

3. Run the campaign following the study design

4. Collect conversions data from all locations

5. Calculate Lift using GeoLift

Historically other geo-based measurement solutions like Match Market Tests can be subject to bias, as the likelihood of finding exact matching test and control groups can decrease rapidly with limited historical data and multiple variables to control for. For example, measuring the impact of an AFL campaign by using Sydney and Melbourne as the test and control markets is likely to have bias, due to the inherent differences between the two. One of the key benefits of using GeoLift over other solutions is that it incorporates machine learning techniques, specifically **Augmented Synthetic Control Methods (ACSM), to de-bias any natural correlations caused by underlying differences between the two markets.**

Using historical data prior to the treatment, **ACSM works by finding a combination of markets that most closely replicate the test market and creates an artificial or synthetic control market.** The idea being that the test and synthetic control are virtually identical prior to the treatment, and therefore any differences after the treatment started between these two units is the campaign's incrementality. Previous methods could involve looking at data of hundreds of different postcodes to determine the best test and control markets. On the other hand, ACSM can take hundreds of different postcodes and narrow it down to a couple of test and control market combinations.

Similar to Robyn, human intervention is still required to select the final markets - however the market selection process is mostly automated, speeding up the analysis and freeing up marketers and analysts' time for other areas.

There is no doubt that AI and machine learning are making their mark on the world. The growth of these technologies is evident in their widespread adoption, driving innovation across sectors and promising even more advancements as computing power and data availability increase. What's promising for our industry is that AI and machine learning are being integrated for more robust, accurate and faster measurement, as evident in Meta Marketing Science OSTs. The beauty of these OSTs means that you can also download and start leveraging Robyn and GeoLift today!

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industry perspectives on how ai and machine learning are powering marketing measurement now and into the future

Embracing the Creativity Success Paradigm: Predictive AI, the Creative Effectiveness Superhero

Irene Joshy | Head of Creative at Kantar Insights

In advertising, as in life, we know that success comes to the creative, industrious and perseverant. The need to build connections with consumers is at the heart of all marketing. Refining what we say' and 'how we say it' came about when there were a lot more voices to compete against and the brand needed a pure, rarified voice that would be distinctive and magnetic.

With the digital boom, demands on content generation at scale and speed led to brands compromising in favour of presence over consistent impact. But we have lived and learned that just getting noticed is not enough. Recent work done on digital creatives at Kantar reveals that a *quarter of the ads on digital platforms will have no impact or worse, negative impact on brand associations and purchase intent*[1]. Currently, letting even a single dollar of our spend go to waste is disastrous for business. But there is more to driving creative effectiveness than the risk of media wastage.

Creative quality is the single most important ingredient in driving campaign ROI[2]

It is critical to generating profits - creative and effective ads generate more than four times profit.[3]

> So, if the key barrier to creative optimisation is cost and speed, it is time for marketers to reconsider their decision to not test and learn – thanks to predictive AI.

Predictive AI is built on existing databases and is trained on a combination of different complex machine algorithms trained to predict linear and non-linear patterns in advertising across TV and Digital. The state-of-the-art machines tend to use features like:

- Image embedding
- Audio
- OCR (optical character recognition)
- Transcript
- Smart features like logo detection and product displays etc.

[1] Kantar Context Lab Database (YT ads)
[2] Drivers of Brand salience at an overall campaign level. Source Mastering Momentum - Brand Exposure 2020, based on Kantar's Global CrossMedia database
[3] Kantar and WARC collaboration 2023 for short and long-term ROMI impact

And they use an ensemble of a few machine learning techniques such as neural networks, gradient boosting, linear modeling etc. Simply put, the machine makes identifying performance of assets – branded and user generated content – easy and accessible.

The role of AI is informing how and where to deploy your digital assets

AI will categorise them for targeting and driving brand outcomes. It has been absolutely fascinating to take content created using Generative AI and getting a Predictive AI to predict its performance – an AI ecosystem that works like a Content Factory at the service of brands.

At Kantar, we know that 82 per cent of ads are part of a campaign and when customised and well-integrated, deliver a 57 per cent uplift on campaign ROI. Therefore, it is lifechanging to have the ability to run multiple ads and develop points of view on the performance of advertising across categories like the financial sector and the alco-bev category.

As we forge ahead **with newer advancements, creative optimisation will reach near human-levels, and we will all benefit from access to this majestic tool that can help us sharpen our narratives pre-launch as well as in-flight.** This would in turn future proof business and enable us to maximise the value of every dollar spent on media. The future is in democratising access to insights that helps content flourish, be more meaningful and deliver creativity and effectiveness – every time and across every touchpoint.

[1] Kantar Context Lab Database (YT ads)
[2] Drivers of Brand salience at an overall campaign level. Source Mastering Momentum - Brand Exposure 2020, based on Kantar's Global CrossMedia database
[3] Kantar and WARC collaboration 2023 for short and long-term ROMI impact

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AI systems for measuring media contexts, brand safety and attention on advertising

John Hawkins | Chief Scientist at Playground XYZ

Beyond the creative, there are multiple media factors that contribute to effective advertising, and therefore, would benefit from measurement. A comprehensive analysis of advertising effectiveness would look to measure the contextual category of the media content, the quality of the prose, the clutter on the page, and the extent to which the media content contains material that may be of concern to certain brands.

The gold standard of measurement across each of the above-mentioned factors would be a human curated dataset that assesses every ad impression. Unfortunately, such an approach is simply infeasible. To mitigate the need for human involvement, artificial intelligence and machine learning can be used to fill the gap by predicting the influence of these properties.

> Recent advances in language modelling (feeding into ChatGPT) have improved the ability of machine learning algorithms to detect subtle patterns in text, and these advances are making their way through the industry of vendors who provide a variety of machine learning driven services.

When vendors, like GumGum and Playground XYZ, build machine learning driven products they start with a process of annotating data. This means hiring people to manually look at web pages and explicitly determine if the content is safe, what subject it discusses, etc. Typically, the same page will be annotated by multiple people so that it can be determined if the properties of the content are unambiguous. These kinds of internal cross-checks help developers evaluate their systems and provide confidence scores for any prediction.

The final models provide these confidence scores so that the client can decide on their own thresholds. For example, you might decide to only show advertising on pages with greater than 90% confidence of being sport or business content. Alternatively, in post campaign analysis, these confidence scores can be used to understand variations in the media content where your attribution models are indicating greater effectiveness.

Annotation of data for machine learning can move beyond hiring people to manually classify web pages.

Among vendors who offer attention measurement products, there is a subset that collects direct measurements of visual attention to use as a basis for a model.

Vendors in this category, like Playground XYZ, run panels in which remunerated participants consume media while their eyes are tracked. This process facilitates collection of large datasets, providing insights into both media contexts and consumer behaviour, including the attention paid to specific ads. These data can then be used to predict attention on ads in the wild using only the media context and ad impression log of user behaviour. The attention metric becomes available as another data point that can be analysed among all factors of advertising campaigns that contribute to effectiveness.

Large scale machine learning driven measurement of ad impressions means that analysis and modelling need no longer be limited to working at either the scale of the overall media spend or depend on cookies. By providing a range of informative metrics and properties attached to ad impressions, marketers can mine their data to find valuable niches for campaign executions.

industry perspectives on how ai and machine learning are powering marketing measurement now and into the future

Advancements in AI and the Opportunities for Attribution

Dave Goodfellow | Head of Measurement, Australia, Japan and New Zealand at Pinterest

"Nothing about advertising is absolute. All we have are likelihoods and probabilities." I came across this adage through Bob Hoffman, affectionately known as the Ad Contrarian, and it's really stuck with me.

Marketing Measurement and Analytics conveys the idea of being a precise or exact science, but the reality is there's a lot of 'art' going on under the hood too. That's not to say that Measurement isn't rigorous, principled and effective (it is!), but it's also important to acknowledge and understand its imperfections.

As marketers, analysts or any kind of person working with Ads Measurement data, we're constantly searching for the 'best fit' solution to a problem. This requires assessing many different factors to produce the most representative view possible of the impact of marketing activity. That's a challenging process on a good day, especially with many of the factors constantly changing (e.g. changes in approaches to Privacy that either significantly alter or eliminate established signals). And that makes it perpetually difficult to navigate the fine line between achieving the best fit or ending up with an over-fitted and overly complex solution or an under-fitted and overly simplistic solution.

Ads Measurement has many areas that may benefit from AI and ML based enhancements.

> Digital Attribution may be the most ideal candidate for disruption though, when considering areas that could benefit most from better processing and interpreting the many likelihoods and probabilities of advertising.

Attribution is one of the most heavily used and important forms of measurement for many advertisers. It tells you where the money's coming from and where it's not. However, the 'fit' that's used to arrive at those conclusions varies significantly, and in many cases sits more on the under-fitted side of the spectrum. That was less true 5-10 years ago though.

When third party (3P) cookies were at their peak, attribution was one of the most comprehensive and insightful parts of a Marketers' toolkit. Marketers were able to understand individual and aggregate customer journeys using 3P tracking cookies to connect disparate activity across different platforms, devices and other touchpoints. This built an incredibly vivid picture of the customer journey for marketers, and at the time rhetoric around achieving a 'single view of customer' was everywhere.

As the industry's data practices have collectively improved though, this began to significantly obscure the once vivid picture of consumer / customer activity created by 3P tracking cookies. Browsers and operating systems became more transparent, tracking data and identifiers became either unavailable or no longer interoperable, and the view of the customer journey became fragmented once again. Instead of a single view of a customer across many environments, 'walled gardens' began to pop up with their own deterministic data and limited or no ability to relate activity from one garden to another.

Suffice to say, that today's picture of attribution isn't what it used to be, and definitely no longer the best fit for what marketers intend to use it for. Attribution data is mostly deterministic and the view it creates of marketing effectiveness is constrained by many factors - non-persistent ways to identify consumers, isolated datasets (by channel or device), overly simplified rule based attribution (e.g. last touch attribution or linear attribution models), primarily based on click-only data, methods that are slow to adapt to changing consumer and technology conditions, and a method that's far from causal.

These constraints, while significant, also present some of the greatest opportunities for AI and ML to expand the effectiveness and utilization of digital attribution data.

Here are the areas I believe will be the most important opportunities for enriching measurement practices with AI:

Greater adaptability for scaling datasets

As the linkages between digital environments evaporate, the volume and velocity of data produced by individual environments increases significantly to counter signal-loss. As this data grows (often exponentially) it becomes more challenging and inefficient to synthesise and interpret using exclusively human-led methods. AI based models may provide a path to greater adaptability as this continues into the future.

Shifts toward probabilistic and incremental attribution modelling

As observed and deterministic behavioural data becomes more limited to individual channels or moments within the consumer journey, probabilistic and incremental models become the primary means to create connections between channels and interpret overall impact. The scale of data required to achieve this, as well as the large potential variations in data is better suited to AI-led modelling. This also opens up the possibilities and practicalities of non-linear attribution modelling.

Building beyond click-based signals

This is something that can be done today, with view and engagement based attribution data being available from many channels. However, the most used attribution analytics and reporting systems today primarily or exclusively utilize click-only data because they lack visibility on other data and their standard models are not designed to support it. With a greater amount of signals able to be processed using AI modelling, this also opens up the ability to better build beyond the click and incorporate the many other exposures within attribution platforms. This also provides a platform to better test and integrate evolving effectiveness signals like attention and predictive creative performance.

While there is undeniable opportunity to incorporate AI based modelling into Attribution and other Ads Measurement practices, there are also practical considerations that marketers will need to observe to best capitalise on AI and ML advances:

Healthy First Party Data is more critical than ever

we should all be familiar with the principle of 'bad data in, bad data out' and so if marketers begin to be able to operate more effectively at larger scale using AI and ML based models, the shortcomings of poor data collection or organisation strategies will become more
pronounced - potentially with more significant impacts. For this reason, building effective first party datasets and data management strategies will be more crucial than ever.

Connected data is essential

Many Ads Data processes have migrated from manual to automated processes over the past few years. For example, the shift towards APIs for conversion data, ads reporting, shopping catalogues and more. For AI based modelling to be most useful and adaptable, the input data needs to leverage these kinds of automated connections between datasets and applications to best manage scalability.

Offline data remains challenging

Lots of data can be factored into new kinds of AI modelling, but any kind of offline activity that isn't able to be produced or connected to other data will still remain elusive. For example, you're probably still not going to be able to tell which customers walked by your billboard on a given day.

Results still need validation

AI based processes may make it more efficient to arrive at some conclusions, but the possibility for errors in the path to arriving at a conclusion is non-zero. For this reason, the results and conclusions of AI and ML led measurement also required validation. This is most crucial in the early stages of developing and training models, but will continue as new data elements are incorporated into the process over time.

Human oversight required

Perhaps the most important consideration with developing AI based approaches to measurement is trying to account for potential unintended and yet unknown human consequences that it may surface. For example - If the models produced by the industry over the next decade were to optimize towards a specific behaviour, what will the downstream effect be on the end user? This is a challenging aspect to address ahead of time, but if as an industry we make this a priority up front we can minimize or eliminate potential flow on impacts.

We're still early in the development and deployment of AI based techniques in Ads Measurement, and there is immense opportunity for AI to complement and enhance many aspects of Ads Measurement. While it's unclear yet what a 'best fit' scenario may look like for AI-augmented digital attribution and other measurement methods, the opportunity is undeniable and exploring that is ultimately one of the most exciting aspects of it.

> Looking ahead - and hopefully not too distant in the future - my hope would be to see key measurement shifts enabled by the scalability and adaptability of AI build key areas like real-time probabilistic and incremental attribution, as well as privacy led attribution and ad effectiveness techniques.

To get there will require a mix of marketers embracing their curiosity and technology, in a way that's mindful of potential broader impacts. While that climb might be steep, I anticipate the view from the top and the lookback at where we are today will be worth the effort.